Upland Hardwood Silviculture Training

Agenda & Topic Objectives

Bent Creek Experimental Forest

July 25-29, 2011

Welcome

We have a great selection of topics and speakers. Each speaker is noted for their expertise of the subject matter. Please see "About the Speakers" in the back of this agenda for more information on each speaker. Below is the agenda for the week with a short description of each session. Most sessions are 50 minutes in length unless otherwise noted. Class will start at 8:00, Tuesday through Friday and we will try to end at 5:00 each day. Monday we will start at 10:00 and Friday we will end at 12:30 to allow for travel time. A laptop is required for some sessions. Field trips are planned for Tuesday, Wednesday and Thursday. During two sessions on Monday and Friday you will go a short walking distance from the training center into the woods. Please be prepared for field work (rain or shine) each day. Lunch is on your own each day except Tuesday when a box lunch will be provided.

Monday, July 25

10:00 *Welcome, Introductions & Logistics*

10:30-11:20 Disturbance History of the Southern Appalachians
Dr. Beverly Collins, Associate Professor, Western Carolina University, NC

Dr. Collins will give an overview of the various causes of stand disturbances in the Southern Appalachians. Course participants will learn how both natural and human-caused disturbances have shaped landscape composition over the past 300 years.

11:30-12:20 Environmental Gradients and Forest Composition
Henry McNab, Research Forester, Bent Creek Experimental Forest

Mr. McNab will give an overview of the three primary components common to all forest sites (temperature, moisture, and nutrients) that combine in various proportions to form a range of environments. Course participants will gain an understanding of how physical site gradients influence species composition in upland hardwood forests. Students will walk to a range of sites that demonstrate basic underlying properties that affect site quality and species composition.

12:30-1:20 *Lunch on your own*

1:30-2:20 Forest Site Classification
Henry McNab, Research Forester, Bent Creek Experimental Forest

Mr. McNab will summarize the reasons for grouping forest sites by their productive capacity and briefly review the strengths and weaknesses of the traditional method of site classification using site index. He will also discuss alternative methods of site classification based on ecological methods and a recently-developed method based on a simple tree list. Course participants will understand the importance of site classification in forest management.

2:30-3:20 **Hardwood Ecology and Regeneration**
David Loftis, PhD, Research Forester Emeritus, Bent Creek Experimental Forest

Dr. Loftis will discuss ecological concepts that can provide an understanding of the process of hardwood regeneration in the Southern Appalachians. Concepts will include **Initial Floristics** and **Vital Attributes of Species** as bases for understanding the regeneration process, using familiar species to illustrate important differences in the regeneration strategies of the many species that occur in our upland hardwood forests.

3:30-5:00 **REGEN Model**
Tara Keyser, PhD, Research Forester, BCEF

Dr. Keyser will demonstrate how a multi-species regeneration model can be used to evaluate hardwood regeneration potential and how this model can be readily adapted to the local conditions found by course participants. **Participants will need to bring a laptop for this exercise and will have a short field exercise.**

Field Exercise: Bent Creek Experimental Forest Campus: Regeneration Plots
Participants will gain skill in collecting regeneration inventory data in woods next to the training center

5:00 **Adjourn**

Tuesday, July 26

8:00-8:50 **Managing Wildlife Species and Associated Habitat**
And
Production and Management of Hard Mast and Fleshy Fruit
Cathryn Greenberg, PhD, Project Leader & Research Ecologist, BCEF

Dr. Greenberg will discuss impacts of silviculture and prescribed fire on several wildlife species. She will present ideas and techniques for managing forests where wildlife is a consideration. She will also discuss current research studies on hard mast and fleshy fruit and the implications on wildlife.

9:00- 9:45 **Travel to Green River Game Land – Field Trip**

Group will travel 45 minutes by bus to Green River Game Land located in Henderson/Polk County and operated by the NC Wildlife Resources Commission.

9:45-12:15 **Fire in Upland Hardwood Forests: Fire and Fire Surrogate Study**
Dr. Thomas Waldrop, Southern Research Station, Clemson, SC
Dr. Cathryn Greenberg, PhD, Project Leader & Research Ecologist, BCEF

Dr. Tom Waldrop will discuss main points regarding fire in upland hardwood forests and discuss the Fire and Fire Surrogate study in the field at Green River Game Lands. Katie Greenberg will discuss effects of fire and other fuel reduction methods on wildlife communities.

12:15-12:45 *Lunch in woods–preorder lunch box*

12:45-1:30 Travel to Bent Creek Experimental Forest – Field Trip continued

Group will return by bus to Bent Creek Experimental Forest and continue with a field trip on the forest to observe and discuss silviculture practices and research results.

1:30-5:00 Field Trip: Managing Southern Appalachian Hardwoods
David Loftis, PhD, Research Forester Emeritus, BCEF
Tara Keyser, PhD, Research Forester, BCEF
Henry McNab, Research Forester, BCEF
Tom Waldrop, Research Forester, Southern Research Station
Cathryn Greenberg, PhD, Research Ecologist & Project Leader, BCEF

Scientists will discuss key ecological concepts in the management of Southern Appalachian Hardwood Forests through past and ongoing research and demonstration areas on the Bent Creek Experimental Forest. Course participants will gain a full appreciation of the various regeneration harvest methods and associated reforestation issues and related wildlife habitat considerations.

5:00 Adjourn

Wednesday, July 27

8:00-9:50 Emerging Forest Health Issues
Steve Oak, Pathologist, Forest Health Protection, U.S. Forest Service

Course participants will gain an understanding of critical insect and disease agents in mountainous hardwood ecosystems. Mr. Oak will explain the imminent impacts of gypsy moth infestations and how to manage susceptible stands now. He will discuss the probable causes, consequences, and management implications of oak decline, sudden oak death, and other emerging forest health issues.

10:00-10:50 Intermediate Stand Management
Gary Miller, PhD, Research Scientist, Northeastern Research Station

Dr. Miller will discuss hardwood stand development from canopy closure to stand maturity in terms of growth rates, crown differentiation, and mortality. Course participants will understand how crop tree management and stand density control affect the long-term development of a hardwood stand.

11:00-11:50 Economic Considerations of Hardwood Management
Gary Miller, PhD, Research Scientist, Northeastern Research Station

Dr. Miller will discuss the financial considerations involved in investments such as herbicide control of competing vegetation and intermediate stand treatments. Discussion will explore the economic realities faced by private landowners.

12:00-12:50 *Lunch on your own*

1:00-2:50 Field Trip: Crop Tree Management on the Biltmore Estate
Gary Miller, PhD, Research Scientist, Northeastern Research Station

Dr. Miller will challenge participants to implement assigned management objectives through crop tree designation.

3:00-4:50 **Field Trip: Forest Management at the Biltmore Estate**
Bill Alexander, Landscape and Forest Historian, Biltmore Estate
Parker Andes, Director of Horticulture, Biltmore Estate

Mr. Alexander and Mr. Andes will lead a tour of the forest operations on the Biltmore Estate. Course participants will learn about the rich history of Biltmore's forestry legacy and see and learn about current forest management activities on the Estate.

5:00 **Adjourn**

Thursday, July 28

8:00-8:50 **Artificial Regeneration of Oaks**
Stacy Clark, PhD, Research Forester, Southern Research Station

Dr. Clark will discuss the state of the art in artificial regeneration methods for oak and chestnut species. The talk will focus on methods to obtain high-quality seedlings for planting. She will discuss response of seedlings to different silvicultural treatments, drought, and deer browse.

9:00-9:50 **Restoration of American chestnut**
Stacy Clark, PhD, Research Forester, Southern Research Station

Dr. Clark will give a history of the American chestnut, highlighting gaps in the silviculture knowledge base for this species. Course participants will learn about the latest research in the genetics, nursery stock and applied silviculture aimed at American chestnut restoration.

10:00-10:50 **Biomass**
Robert Rummer, PhD, Project Leader, Southern Research Station, Auburn, AL

Biomass utilization in southern forests offers managers new tools to achieve desired future conditions. The technology for recovering low-value material is rapidly evolving and Dr. Rummer will cover the alternative approaches that are available. In addition he will discuss the impacts, costs and limitations of biomass recovery operations in hardwood forests.

11:00-11:50 **Climate Change**
James Vose, PhD, Project Leader, Coweeta Hydrologic Laboratory, Otto, NC

Dr. Vose will discuss current climate change research projects and the possible effects changes in climate will have to our southern forests.

12:00-12:50 *Lunch on your own*

1:00-2:50 **Managing Low Quality Stands**
Jeff Stringer, PhD, Research Silviculturist/Extension Specialist,
University of Kentucky

Dr. Stringer will discuss the management of stands which have been cut over, or high-graded, to the extent that they no longer meet management objectives. He will present real-life examples in which intermediate stand treatments and regeneration harvests were used to manage the depleted stand.

3:00-5:00 **Field Trip: Low Quality Stand Management**
Jeff Stringer, PhD, Research Silviculturist/Extension Specialist, University of Kentucky

Dr. Stringer will lead a field exercise in which course participants will develop a silvicultural prescription for a low quality stand. Students will evaluate whether an intermediate stand treatment is suitable or a regeneration harvest is needed to meet management objectives.

5:00 **Adjourn**

Friday, July 29

8:00-8:50 **Effects of Management on Carbon Storage and Rates of Carbon Sequestration**
Tara Keyser, PhD, Research Forester, BCEF

Dr. Keyser will discuss the use of forestland to offset anthropogenic carbon emissions and discuss the implications of various land management activities on carbon storage in southeastern upland hardwood forests.

9:00-9:50 **FVS: Forest Vegetation Simulator**
Chad Keyser, Forester, Forest Management Service Center, USFS

Mr. Keyser will discuss and demonstrate the Forest Vegetation Simulator (FVS), the USDA Forest Service's nationally supported framework for forest growth and yield modeling. FVS is used by forest and natural resource managers to predict future vegetation response to silvicultural practices.

10:00-12:00 **Nonnative Invasive Plants of Southern Appalachian Hardwood Forests**
Gary Kauffman, Forest Botanist, National Forests in North Carolina

Mr. Kaufman will give an overview of exotic and invasive plant species present in our Southern Appalachian Hardwood Forests. Course participants will gain an understanding of the identification, life cycles, and management implications of these non-native species. Participants will move outdoors as Mr. Kaufman demonstrates tools that are available for controlling nonnative Invasives. This outdoor exercise will allow students to identify nonnative Invasives and learn proper procedures for eliminating and controlling nonnative invasive plants. **Participants will need a laptop for this session.**

12:00-12:30 **Evaluations and class acknowledgements**

12:30 **Conclusion**

About the Speakers

The course instructors are experts in his or her field. Below is a biography on each instructor listed in order of appearance.

Beverly Collins

Beverly is an Associate Professor of Biology and Director of the Southern Appalachian Biodiversity and Ecology Center at Western Carolina University. Her research focuses on plant community responses to disturbance, including natural disturbance, military land use, and forest management practices. Before coming to western North Carolina in 2006, she was an Associate Research Ecologist at the Savannah River Ecology Laboratory, where she studied oak regeneration in canopy gaps in bottomland hardwood forests.

Henry McNab

Henry McNab has been a research forester with the Southern Research Station of the U.S. Forest Service for over 40 years. He has worked at research offices in Florida, Georgia, and South Carolina. Since 1983 he has been assigned to the Upland Hardwood Ecology & Management Unit located at the Bent Creek Experimental Forest, near Asheville. His current research assignment deals with forest site classification for timber production and ecological purposes.

David Loftis

David is Scientist Emeritus at Bent Creek Experimental Forest, the Ecology and Management of Southern Appalachian Hardwoods work unit of the Southern Research Station of the U.S. Forest Service located in Asheville, NC. David retired after more than 35 years of research in Appalachian hardwood silviculture. His specialty is hardwood regeneration. BA (Political Science), University of the South; BS (Forestry), University of the South; MF (Forestry), North Carolina State University; PhD (Forestry); North Carolina State University.

Tara Keyser

Tara is a Research Forester with the USDA Forest Service, Southern Research Station, Bent Creek Experimental Forest. Tara holds a BS in forestry from the University of Wisconsin-Madison, and a MS and PhD from Colorado State University. She has worked for the USDA Forest Service since 2007. Her research focuses primarily on the (1) the regeneration ecology of upland hardwood forests in the southern Appalachians; (2) quantifying climate-growth relations for dominant hardwood tree species in the southeastern US; and (3) the effects of prescribed fire on forest structure and composition.

Katie Greenberg

Cathryn (Katie) H. Greenberg is Project Leader and Research Ecologist with the Upland Hardwood Ecology and Management Research Work Unit, Southern Research Station, U.S. Department of Agriculture (USDA) Forest Service. Katie received a BA degree in philosophy from George Washington University, a MS degree from the University of Tennessee, and a PhD from the University of Florida. Her research focus includes (1) effects of forest management practices (such as timber harvesting, fuel reduction practices, and prescribed fire) and natural disturbances (such as wind damage) on plant and animal communities, and (2) production of forest food resources, such as native fleshy fruit and hard mast, in relation to forest types and silvicultural disturbances.

Tom Waldrop

Tom Waldrop is Team Leader for Fire Science with the Southern Research Station's Center for Forest Disturbance Science. He has been located at Clemson, SC for 25 years. Tom holds BS and MS degrees in Forest Management from Clemson University and a Ph.D. in Ecology from the University of Tennessee. His research focuses on many aspects of fire ecology in the Piedmont and Appalachian Region. He is the founder of the Consortium of Appalachian Fire Managers and Scientists which fosters communication and science delivery between fire managers and scientists from Pennsylvania to Alabama.

Steve Oak

Since 1980, Steve has been the forest pathologist with the USDA Forest Service, Southern region, Forest Health Protection located in Asheville, NC. Over the last 31 years Steve has been involved with research on pitch canker disease of slash pine including inoculum production and dissemination, insect vectors, genetic resistance, and management responses. His Forest Service research looked at: oak decline in the southeastern U.S. including regional survey techniques, risk rating, landscape effects modeling, and management responses, pitch canker resistance screening techniques, Sudden Oak Death survey and assessment of risk to eastern hardwood forests.
BS, Juniata College; MF, Duke University.

Gary Miller

Gary is a Research Forester with the USDA Forest Service, Northern Research Station in Morgantown, West Virginia. The research team at this location studies the Ecology and Management of Invasive Species and Forest Ecosystems. He received B.S. and M.S. degrees from West Virginia University and a Ph.D. degree from Virginia Polytechnic Institute and State University. He has conducted research on silviculture and management of central Appalachian hardwood ecosystems since joining the Forest Service in 1981.

Bill Alexander

Bill Alexander has worked in various capacities in landscape and forest management during his 33 years of employment with Biltmore Estate. For the past 12 years, as landscape and forest historian, he has devoted much of his time to research of the extensive records to document the rich history and significance of Biltmore Estate's land stewardship and contributions to the establishment of American forestry.

Parker Andes

Parker is the Director of Horticulture with the Biltmore Estate. A 1980 graduate of West Virginia University, he worked at Longwood Gardens and Callaway Gardens before starting with Biltmore in October 2000. In addition to the Gardens and Landscapes, he has led up the forestry program on the estate's 5,000 acres of woodland for the last 7years. Currently, the estate averages around 500 mbf of harvest yearly, mostly white pine.

Stacy Clark

Stacy has been a Research Forester with the Southern Research Station since 2005 and is stationed in Knoxville, Tennessee on the University of Tennessee campus. She studies artificial regeneration of hardwoods, primarily oak and American chestnut. She also has research projects on prescribed burning and fuel dynamics, and several tree-ring studies to examine forest history and stand dynamics. She obtained her PhD from Oklahoma State University in Plant Science, and her M.S. and B.S. in Forest Resource Management from the University of Tennessee.

Robert R. Rummer

Bob Rummer is the Project Leader for the USDA Forest Service, Forest Operations Research Unit in Auburn, Alabama. His research team studies many aspects of forest operations including productivity, costs and site impacts in order to find a better match between systems and modern forest management objectives. Much of his current work is focused on biomass harvesting, including studies of bundling and baling, understory and range harvesting, and the economic feasibility of different systems.

Jim Vose

Jim is Project Leader and Research Ecologist at the Coweeta Hydrologic Laboratory, USDA Forest Service, Southern Research Station in western North Carolina. He holds a Ph.D in Forest Ecology from North Carolina State University, an M.S. in Forest Ecology from Northern Arizona University, and a B.S. in Forestry from Southern Illinois University. His 20^{+} years of research at Coweeta has focused on understanding the structural and functional attributes of forest watersheds and how watersheds respond to natural disturbances and forest management. He is also the Forest Service Lead-PI on the National Science Foundation Coweeta Long-term Ecological Research Project, a collaborative research effort between the University of Georgia and the Coweeta Hydrologic Laboratory that is examining the interaction of ex-urbanization and climate change on water resources and biodiversity in the southern Appalachians. He has published over 150 research articles and holds adjunct faculty appointments at the University of Georgia, North Carolina State University, and Virginia Tech.

Jeff Stringer

Jeff is an Extension Professor and Research Scientist with the University of Kentucky, Department of Forestry. His research includes applied aspects of oak silviculture and forestry operations. His silviculture work focuses on the enhancement of oak growth and regeneration including oak shelterwood, two-age system development, site preparation for natural regeneration, and crop-tree release. His research in forestry operations includes forestry Best Management Practices use and herbicide applications. He is a nationally recognized extension specialist in hardwood silviculture and timber harvesting. He excels at integrating practical, scientific information for production foresters. His energetic presentations and practical hands-on field exercises engage students.

Chad Keyser

Chad is a forester/biometrician with the USDA Forest Service, Forest Management Service Center, a sub-unit of the national Forest Management staff in Washington, DC. For the last 10 years, he has been supporting and developing the Forest Vegetation Simulator (FVS) across the United States, with recent emphasis being placed on the eastern and southern versions of FVS and the development of a new Alaska Northern Boreal Forest version of FVS. He is a US Army veteran having served in the Gulf War and has received a B.S in Forest Science with Highest Honors from the University of Illinois and a M.S in Forestry from the University of Montana. Chad is remotely located at Bent Creek Experimental Forest.

Gary Kaufman

Gary has been the Forest Botanist for the USDA Forest Service, National Forests in NC, headquartered in Asheville, NC. The National Forests in NC cover 1.1 million acres across 4 forests, the Nantahala and Pisgah National Forests in the mountains, the Uwharrie NF in the Piedmont, and the Croatan NF in the Coastal Plain. Since 2002 Gary has coordinated the invasive plant program across the 4 forests. During the same time he started as and continues to serve as the Forest Botanical Products Specialist. Gary has been with the USFS since 1992 previously filling the Nantahala NF botanist position from 1992 to 2000. Various botanist and ecologist duties Gary has filled on the NFsNC include developing a monitoring program for rare plant species, for collected botanical forest products and for assessing invasive plant species. Other duties include NEPA project review for the botanical resource, planning at the forest level, and restoration of rare plant populations and rare plant communities. He received a Masters degree in botany and mycology from Ohio University.